Nitella furnish common instances. They may be treated with acetic acid and gentian-violet as described, in the latter case cutting the long cells across and forcing out the contents with a needle or fine forceps.*

EXPLANATION OF FIGURES.

(Plate CII.)

Fig. 1.—Filament of *Nostoc* ×350.

2–6.—*Cladophora* (sp?) Showing process of cell-division followed in the same cell. Fig. 2, drawn at 9:30 A. M. Fig. 6, 2:05 P. M. ×300.

7 —A much larger cell of the same ×175.

8.—A dividing cell of *Spirogyra* (sp?) ×300.

9.—A Desmid in process of division; n. the nucleus; p. pyrenoid.

10–14.—Final divisions of the pollen-spores of *Allium Canadense*. Acetic acid, gentian violet ×350. In Fig. 10 the nuclear spindle in the left-hand cell is seen from the pole.

(Plate CIII.)

Division of the pollen-spores of *Podophyllum peltatum*. All the figures were drawn from acetic acid, gentian violet preparations, and all but six are magnified about 625 diameters, the latter about 1200.

Figs. 1–13.—Division stages of the primary nucleus of the mother-cell. Figs. 5–6 seen from the pole, the others from the side.

14–20.—Division of the secondary nuclei and formation of the spores.

21.—Two young isolated pollen-spores.

N–Nucleus; K–Nuclear-plate; F–Spindle-fibers; C–Cell-plate.

On the Naming of "Forms," in the New Jersey Catalogue.

In a recent number of the BULLETIN, (Vol. xvi. 272) when remarking on Mr. Cockerel's paper on the naming of slight varieties, I stated that I had introduced the term "forma" into the Catalogue of Plants found in New Jersey, as a rank to include physiological deviations or variations, such as color, odor and size, reserving for the term "varietas" such as are manifestly structural. I noted at that place that it was indeed difficult to rigidly separate even these characters, so that very slight structural deviations in the size of organs or their number or amount of division, might best come under the rank of "forma." I think that it is only in the latter sense that the term has been used by European authors, especially of the German school, and in their microscopic habits of thought, attempts have been made to attach

*See Strasburger-Hillhouse, p. 369 for *Tradescantia*; "Botanisches Practicum," 1st edit. p. 516 for *Chara* and *Nitella*.

"forma" names to structural peculiarities which we would, in our broader view of nature, pass by as mere individual differences. I do not wish it to be supposed that I approve of any such practice. From my point of view the terms "varietas" and "forma" need not be of different value in classification, although in fact, they generally would be. It would be as difficult to decide in some cases between "species" and "forma," as between "species" and "varietas." There are, I believe, no structural differences between *Datura Tatula* and *D. Stramonium*, but they are believed to have originated in different parts of the world, and the color character of the corolla is, so far as I am aware, constant. There is little but the color of the flowers to separate the American *Nasturium lacustre*, Gray, from the European *N. amphibium*. It appears therefore, that the very characters on which I would base "forma," may be quite as constant as morphological ones universally recognized as specific.

This brings up the whole question of what we should agree upon as constituting a "species." There are no fixed lines in nature. The whole vegetable kingdom is so interlocked by the tendency to variation, working simultaneously with the efforts towards atavism and heredity, that structures are continually produced which defy any system of classification. We are forced to admit, and it ought to be further emphasized in our text books, that intermediate forms may occur between any related groups or individuals, or as Prof. Oliver has put it, "no characters are constant." It is, I believe, useless at the present stage of knowledge to argue that all "species" are rigidly distinct and can be separated by carefully drawn descriptions, if once their characters are understood. Some are naturally more permanent than others, but this will not allow of a sweeping generalization.

It ought to be posssible, however, to adopt some considerations which should guide us all in the elucidation of the problem, and this might well form a feature in an extended discussion. But I do not propose to enlarge further on these general matters at the present time. I wish to speak particularly of the instances which have come under my observation in working out the New Jersey Flora, which list is now about ready for distribution.

Anemone nemorosa, L. forma *quinquefolia*, (L.) (*A. quinquefolia*, L. Sp. Pl. 541; *A. nemorosa*, L. var. *quinquefolia*, Pursh, Fl. Am. Sept. 386.) This differs only from the ordinary state of the eastern American plant, called in all recent books *A. nemorosa*, in the lateral leaf divisions being again divided. This is, indeed, the general condition of the radical leaves, and there are all gradations traceable. As a matter of fact, I now regret having ever written it up in this way, but the early signatures of the catalogue being printed, some explanation of my motive should be made. I am now convinced that our plant is distinct from the European, as was long ago forcibly argued by Barton* and should be called *A. quinquefolia*, L.† A long series of European *nemorosa* and Atlantic American *quinquefolia*, seem to me to show remarkably constant differences. The few West Coast specimens referred to *nemorosa* that I have had opportunity to examine seem again distinct from either,‡ while in the plant of the southern Alleghenies which I have seen in Mr. Canby's herbarium, we must have the genuine Central European *A. trifolia*, as indidicated by Dr. Gray (Amer. Nat. vii. 422.)

Castalia odorata (Dryand.), Woodv. & Wood, forma ROSEA (Pursh.) (*Nymphæa odorata*, var. *rosea*, Bennett, Rhode Island Catalogue.) Flowers large, pink or purple. It has long seemed to me that this striking and beautiful form of the water lily was entitled to a name. It is very well known to exist at various points along the Atlantic coast from Massachusetts to New Jersey, whence I have specimens collected by Mr. Commons near Cape May, and Dr. Lockwood reports it as growing near Manchester and Woodstown.

Aquilegia Canadensis, L. forma FLAVIFLORA (Tenney). (*A. flaviflora*, Tenney, Amer. Nat. i. 389. *A. Canadensis*, L., var. *Phippenii*, Robinson, Flora Essex County. *A. Canadensis*, L., var. *flaviflora*, Britt. Bull. Torr. Club, xv. 97. This manifestly falls into the rank of forma, and the yellow color appears to be perfectly constant.

Viola pedata, L. forma BICOLOR, (Pursh.) (*V. pedata*, var.

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* Comp. Flor. Phila. ii. 20; Fl. N. A. ii. 10.

† I have so designated it in the Addenda to the New Jersey Catalogue.

‡ *A. Grayii*, Kell. and Behr.

bicolor, Pursh). This also offers very constant color characters, so far as I am informed, but I can make out no structural differences betweeen it and the type.

Viola pedata, L. forma ALBA (Thurber). (*V. pedata*, var. *alba*, Thurber, Bull. Torr. Club, i. 20). Evidently an albino. It occurs with the typical plant, and transitional colors are common.

Viola palmata, L. forma *striata*, Willis, Bull. Torr. Club, xvi. 278. This is the pubescent upland plant, with lobed leaves. In spite of the great amount of work done on our eastern violets, I do not yet believe that they are understood. They can only be known through the accumulation of a great amount of herbarium material, and long-continued field observation. The time of blooming is very different in some of the kinds now referred to *V. palmata*, from which I suspect *V. cucullata* to be abundantly distinct.

Viola cucullata, Ait., forma ALBIFLORA. Flowers white. An albino, not uncommon with the type, or what I take to be the type.

Lupinus perennis, L., forma ROSEA. Flowers beautifully pink. May's Landing, Atlantic Co., Dr. J. E. Peters.

Epilobium spicatum, Lam. forma ALBIFLORUM. Flowers white. North Spring Lake, Lighthipe.

Aralia nudicaulis, L., forma PROLIFERA (A. C. Apgar). (*A. nudicaulis*, L., var. *prolifera*, A. C. Apgar, Bull. Torr. Club, xvi. 166). Described from specimens collected near Lambertville, N. J.; since found by Miss P. A. McCabe at White Plains, N. Y.

Vernonia Noveboracensis, (L.), Willd., forma ALBIFLORA. An albino of occasional occurrence.

Eupatorium perfoliatum, L., forma PURPUREUM. Flowers purple. Budd's Lake, Dr. Porter.

Liatris spicata, (L.), Willd., forma ALBIFLORA. An albino found by Rev. Mr. Lighthipe near Bay Head.

Solidaga odora, Ait., forma INODORA (Gray). (*S. odora*, var. *inodora*, Gray. Man. 244). Quaker Bridge, Leggett.

Cnicus altissimus, (L.), Willd., var. *discolor*, (Muhl.), Gray, forma ALBIFLORA. An albino from Carlstadt, Rev. R. E. Schuh. Found also on Long Island and Staten Island.

Lobelia syphilitica, L., forma ALBIFLORA. An albino of occasional occurrence.

Gaylussacia resinosa, (Ait.), T. and G., forma LEUCOCARPA (Porter). (*G. resinosa*, var. *leucocarpa*, Porter, Bull. Torr. Club, xvi. 21). In my view better referable to this rank.

Sabbatia stellaris, Pursh., forma ALBIFLORA. Flowers white. Not uncommon.

Gentiana Andrewsii, Griseb., forma ALBIFLORA. An albino, found at Tenafly by Dr. Milton Turnure, and known also from Pennsylvania.

Phlox subulata, L., forma ALBIFLORA. Flowers white. Lambertville, A. C. Apgar.

Gerardia purpurea, L., forma ALBIFLORA. Flowers white. An albino of occasional occurrence.

Gerardia tenuifolia, Vahl, forma ALBIFLORA. Flowers white. An albino found by Mr. Leggett at South Amboy, and by Mr. Schuh at Rosemont.

Brunella vulgaris, L., forma ALBIFLORA, (Bogenhard). (*B. vulgaris*, var. *albiflora*, Bogenhard, Fl. Jena. 315). Flowers white. Found by Mr. Lighthipe at Woodbridge.

Calopogon tuberosus, (L.), B. S. P., forma ALBIFLORUS. Flowers white. May's Landing, Dr. Peters.

Sisyrinchium angustifolium, Mill., forma ALBIFLORUM (Raf.) (*S. albiflorum*, Raf.) Found at Point Pleasant by Prof. E. H. Day, and at Freehold by Dr. Lockwood.

Lilium Canadense, L., forma RUBRUM. Flowers red. Near West Milford, Passaic Co., Britton, and reported from Bergen Co. by Mr. Woolson.

Tradescantia Virginica, L., forma ALBIFLORA. Flowers white. Found by Dr. Porter at Holland, Hunterdon Co.

Sagittaria sagittæfolia, L., forma OBTUSA (Willd.), (*S. obtusa*, (Willd.); forma LATIFOLIA (Willd.), (*S. latifolia*, Willd.); forma HASTATA (Pursh); (*S. hastata*, Pursh), forma ANGUSTIFOLIA (Engelm.), (*S. variabilis*, var. *angustifolia*, Engelm.); forma GRACILIS (Pursh), (*S. gracilis*, Pursh.)

I am of the opinion that the reference of this species known in the Manuals as *S. variabilis*, Engelm., to the Old World *S. sagittæfolia*, as Micheli has it in DeCandolle's Monographs,

Vol. iii. 66, is the most satisfactory disposition of it, and that the varieties named by Dr. Engelmann in the fifth edition of Gray's Manual are better regarded as forms.

N. L. BRITTON.

On Buxbaumia indusiata, Bridel.

In a small collection of mosses lately sent from the new State of Washington by Mr. Charles V. Piper, there were a few small specimens of *Buxbaumia*, which were found growing on wet logs at Seattle in June, 1889. The plants were still attached to bits of the log, and were surrounded with *Tetraphis pellucida*, a *Hypnum* and five species of Hepaticæ.* The wood of the log is reddish-brown in color, and is plainly coniferous; it may be *Thuya gigantea*. The plants of *Buxbaumia* are rather over-mature, and have lost their opercula, and the outer peristome is pretty much gone also. The capsules are irregular in shape, but on the average more ovate-cylindrical than those of *B. aphylla*, and are paler in color. Recognizing them as probably *Buxbaumia indusiata*, it became desirable to prove them to be this species, the existence of which in the western hemisphere had never to my knowledge been announced or even suspected.

I could not obtain a satisfactory peristome, and though the habitat, on wet decaying logs, the shape of the capsules and the color were all that one should look for in *B. indusiata*, something more was wanting. Noticing that Schimper says that the spores of *B. indusiata* are thrice the diameter of those of *B. aphylla*, I compared the spores of the Washington plant with those of *B. aphylla* from Connecticut, and found them about two and a half times larger, and all doubt of the reality of Mr. Piper's most interesting discovery vanished.

Mrs. Britton, on learning of this discovery, most kindly shared with me a few plants of a *Buxbaumia* collected March 23, 1889, by Mr. J. B. Leiberg on decaying logs in Kootenai County, Idaho, and these also proved to be *B. indusiata*, one or two of them

*Prof. Underwood has kindly identified these Hepaticæ; *Aneura palmata* is the most abundant species; the others are *Cephalozia multiflora*, *C. bicuspidata*, *Jungermannia incisa* and *Blepharostoma trichophyllum*. The *Hypnum* is apparently a young plant of *Plagiothecium undulatum*.